	Application No.	Applicant(s)
Notice of Allowability	09/608,395	LARSON ET AL.
	Examiner	Art Unit	
	Cindy Nguyen	2161	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *04/03/06*.

2. ☒ The allowed claim(s) is/are *1-6,8,9,11,24,25,27-29 and 31-42*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of

    Paper No./Mail Date _____ .

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

DETAILED ACTION

This is in response communication filed 04/03/06.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes

and/or additions be unacceptable to applicant, an amendment may be filed as provided

by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be

submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview

with Dave Thomson on 06/13/06.

The claims1-6, 8, 9, 24, 25, 27-29, 31 and 32 had been amended. Claims 33-42

had been added.

1. (Currently Amended) A method, at least partially implemented by a computing device, for

processing a database query, comprising:

partially pre-aggregating records in a database to provide a result that contains at least two

records having like grouping column values;

aggregating records derived from the partial pre-aggregation result that contains at least two

records having like grouping column values to provide a result that contains records having

unique grouping column values; and

partially pre-aggregating the records in the database only if an estimation, based in part on a

calculation of a probability that a record will be absorbed by a group of records already in

memory, indicates that a number of records in the result that contains at least two records having

like grouping column values is significantly less than a number of records in the database, ~~output~~

~~records from the partial pre-aggregation will be significantly less than a number of input records~~

~~to the partial pre-aggregation.~~ wherein the estimation is based on factors comprising:

>a number of output records, T(N);

>a number of input records, N; and

>a relationship

$$T(N) = M + (N - M)(1 - A(R(M))) = M + (N - M)\sum_{i=1}^{D}(1 - p_i)^{R(M)};$$
wherein M records can fit into memory.

2.   (Original) The method as recited in claim 1, wherein the partially pre-aggregating further

comprises:

maintaining a record store in memory, the record store having one record for each different

grouping column value encountered in the operation;

receiving a new record;

combining the new record with a record having the same grouping column value, if such a record

exists; and

adding the new record to the record store in the memory if there is no record in the record store

that has the same grouping column value as the new record.

3.   (Original) The method as recited in claim 2, further comprising:

adding additional new records to the record store until the record store reaches a capacity such

that it can accept no new records; and

outputting one or more records from the record store to a subsequent database operator.

4.   (Original) The method as recited in claim 3, wherein after the one or more records have

been output to the subsequent database operator, the adding and outputting are repeated until

there are no new records to process.

5.   (Original) The method as recited in claim 4, wherein any records remaining in the record

store after there are no new records to process are output to the subsequent database operator.

6.   (Original) The method as recited in claim 3, wherein the subsequent database operator is

a join.

7.   (Cancelled)

8.   (Original) The method as recited in claim 1, wherein the partially pre-aggregating

includes utilizing a hashing function.

9.   (Original) The method as recited in claim 1, wherein the partial pre-aggregating creates a

record store in memory, and wherein the method further comprises utilizing the record store in

memory for one or more other database operators.

10.   (Cancelled)

11.   (Original) A computer programmed to perform the method recited in claim 1.

12—23.   (Cancelled)

24.   (Currently Amended) A relational database computer program stored on a computer-

readable medium, the relational database computer program comprising computer-executable

instructions that, when executed on a computer, perform ~~the following~~ steps comprising:

receiving a stream of input records;

partially pre-aggregating the input records according to a single grouping column to provide a

result that contains at least two records having like grouping column values, wherein the ~~partial~~

~~pre-aggregation~~ partially pre-aggregating the input records is performed if an estimation, based

~~in part~~ on a calculation of a probability that a record will be absorbed by a group of records

already in memory, indicates that a number of ~~output records from the partial pre-aggregation~~

~~will be significantly less than a number of input records to the partial pre-aggregation;~~ records in

the result that contains at least two records having like grouping column values is significantly

less than a number of records in the stream of input records, wherein the estimation is based on

factors comprising:

          a number of output records, T(N);

          a number of input records, N; and

          a relationship:

$$T(N) = M + (N - M)(1 - A(R(M))) = M + (N - M)\sum_{i=1}^{D}(1 - p_i)^{R(M)};$$
          wherein M records can fit into memory;

joining the partially pre-aggregated records with other data to create a record store; and

aggregating records within the record store to provide a result that contains records having

unique grouping column values.

25.   (Original) The relational database computer program as recited in claim 24, wherein:

the record store has a capacity that is less than the number of records in the stream of input

records; and

the aggregating each input record is performed until the record store reaches capacity.

26.   (Cancelled)

27.   (Previously Presented) The method of claim 1, wherein the estimation is based, in part,

on an estimated absorption rate by which records are absorbed by records in memory.

28.   (Currently Amended) The method of claim 27, wherein the absorption rate ~~of available~~

~~memory~~ is estimated, in part, based on a number of records expected to be processed.

29.   (Previously Presented) The method of claim 28, wherein the number of records expected

to be processed is estimated, in part, based on a number of records that will fit in memory.

30.   (Cancelled)

31.   (Currently Amended) The method of claim [[30]]1, wherein the number of input records,

N, is known.

32.   (Currently Amended) The method of claim [[30]]1, wherein the number of input records,

N, is estimated.

33.   (New) The relational database as recited in claim 24, wherein the partially pre-

aggregating further comprises:

maintaining a record store in memory, the record store having one record for each different

grouping column value encountered in the operation;

receiving a new record;

combining the new record with a record having the same grouping column value, if such a record

exists; and

adding the new record to the record store in the memory if there is no record in the record store

that has the same grouping column value as the new record.

34.   (New) The relational database as recited in claim 33, wherein the steps further comprise:

adding additional new records to the record store until the record store reaches a capacity such

that it can accept no new records; and

outputting one or more records from the record store to a subsequent database operator.

35.   (New) The relational database as recited in claim 34, wherein any records remaining in the record store after there are no new records to process are output to the subsequent database operator.

36.   (New) The relational database as recited in claim 24, wherein the partially pre-aggregating includes utilizing a hashing function.

37.   (New) The relational database as recited in claim 24, wherein the partial pre-aggregating creates a record store in memory, and wherein operation of the relational database further comprises steps utilizing the record store in memory for one or more other database operators.

38.   (New) The relational database as recited in claim 24, wherein the estimation is based, in part, on an estimated absorption rate by which records are absorbed by records in memory.

39.   (New) The relational database as recited in claim 38, wherein the estimated absorption rate is estimated, in part, based on a number of records expected to be processed.

40.   (New) The relational database as recited in claim 39, wherein the number of records expected to be processed is estimated, in part, based on a number of records that will fit in memory.

41.   (New) The relational database as recited in claim 24, wherein the number of input

records, N, is known.

42.   (New) The relational database as recited in claim 24, wherein the number of input

records, N, is estimated.

Allowable Subject Matter

Claims 1-6, 8, 9, 11, 24, 25, 27-29 and 31-42 are allowable over the prior art of

record.

The following is an examiner's statement of reasons for allowance: Claims 1 and 24 are

allowable because the prior art of record or that encountered in searching for the

invention, fails to discloses or suggest a method and a relational database computer

program stored on a computer-readable medium, the relational database computer

program comprising computer-executable instructions that, when executed on a

computer performs steps comprising: partially pre-aggregating the records in the

database only if an estimation based on a calculation of a probability that record will be

absorbed by a group of records already in memory, indicates that a number of records

in the result that contains at least two records having like grouping column values is

significantly less than a number of records in the database, wherein the estimation is based on

factors comprising:

 a number of output records, $T(N)$;

 a number of input records, N; and

a relationship:

$$T(N) = M + (N - M)(1 - A(R(M))) = M + (N - M)\sum_{i=1}^{D}(1 - p_i)^{R(M)};$$

wherein M records can fit into memory, as claimed.

Claims 2-6, 8, 9, 11, 25, 27-29 and 31-42 depend form claims 1 and 24, and are therefore allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

1.   *Contact Information*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cindy Nguyen whose telephone number is 571-272-4025. The examiner can normally be reached on M-F: 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gaffin Jeffrey can be reached on 571-272-4160. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should

be directed to the receptionist whose telephone number is 703-305-3900.

CN

Cindy Nguyen

June 13, 2006   FRANTZ COBY
                                                           PRIMARY EXAMINER